North Coast Watershed Assessment Program

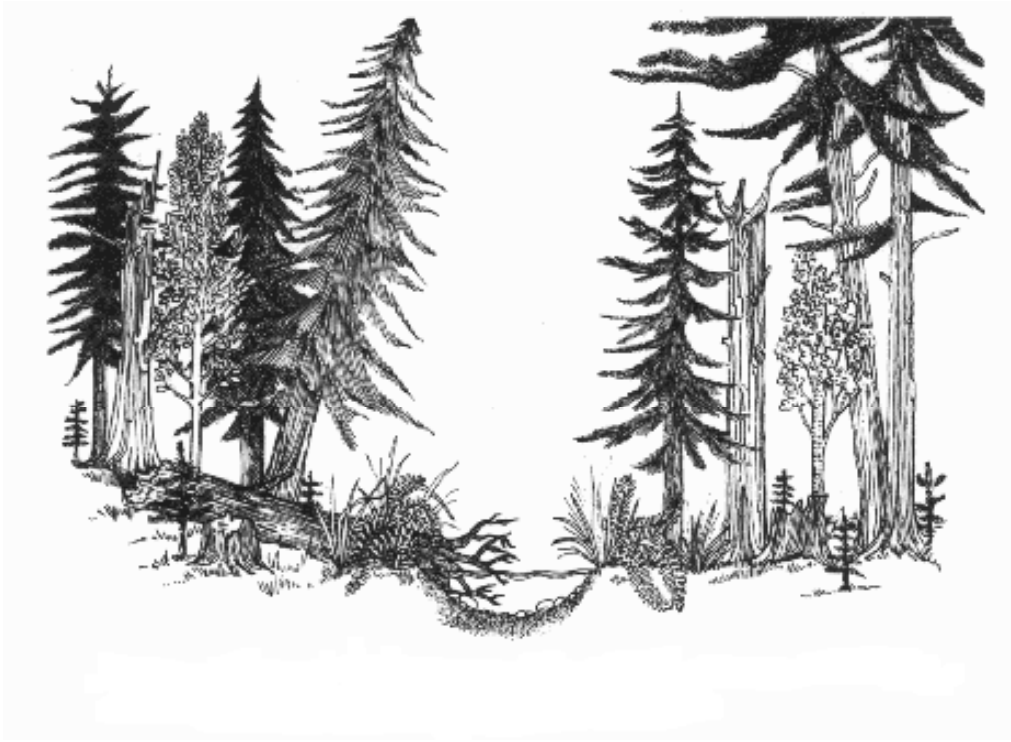
DRAFT

Mattole Watershed Synthesis Report

The mission of the North Coast Watershed Assessment Program is to conserve and improve California's north coast anadromous salmonid populations by conducting, in cooperation with public and private landowners, systematic multi-scale assessments of watershed conditions to determine factors affecting salmonid production and recommend measures for watershed improvements.

Public Review Draft - March 22, 2002

Western Mattole Subbasin

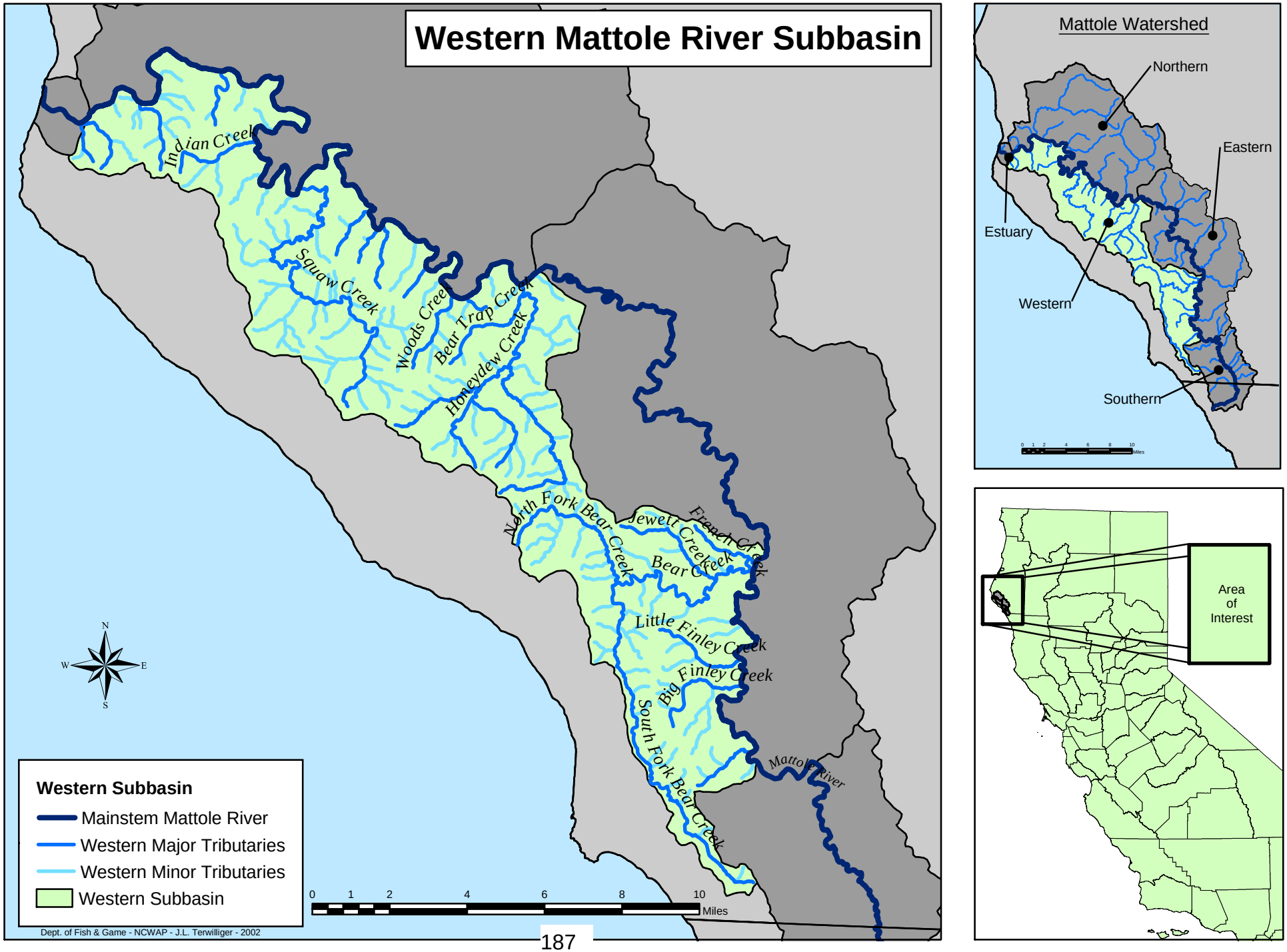


Introduction

The "Western" subbasin is located between the Bear Creek in the estuary (River Mile 0.3) and the headwaters of the South Fork of Bear Creek (River Mile 50) along the western side of the Mattole mainstem and Wilder Ridge for a distance of about sixty miles (see map on the following page). There are thirty perennial streams that drain a watershed area of 89 square miles. The DFG has recently surveyed 41.5 miles of the subbasin's anadromous reaches. Elevations range from 20 feet at the estuary to approximately 2,800 feet in the headwaters of the tributaries in the King Range. Kings Peak, at 4,088 feet is the highest point in the Mattole River basin.

Climate

The Western subbasin is greatly influenced by the King Range which is its western boundary. Temperatures have a wide range because the mountains cut off the moderating effect produced by marine air. Precipitation totals vary from 70 to 100 inches annually.Rainfall averages are highest in the center of this subbasin because the greatest orographic effect occurs here due to the presence of the King Ranges' tallest peaks.


Western Mattole River Subbasin
Indian Creek
Squaw Creek
Woods Creek
Bear Trap Creek
Honeydew Creek
North Fork Bear Creek
Jewett Creek
French Creek
Bear Creek
Little Finley Creek
Big Finley Creek
South Fork Bear Creek
Mattole River
N
W
E
S
Western Subbasin
Mainstem Mattole River
Western Major Tributaries
Western Minor Tributaries
Western Subbasin
0 1 2 4 6 8 10
Miles
Dept. of Fish & Game - NCWAP - J.L. Terwilliger - 2002
Mattole Watershed
Northern
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Estuary
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0 1 2 4 6 8 10
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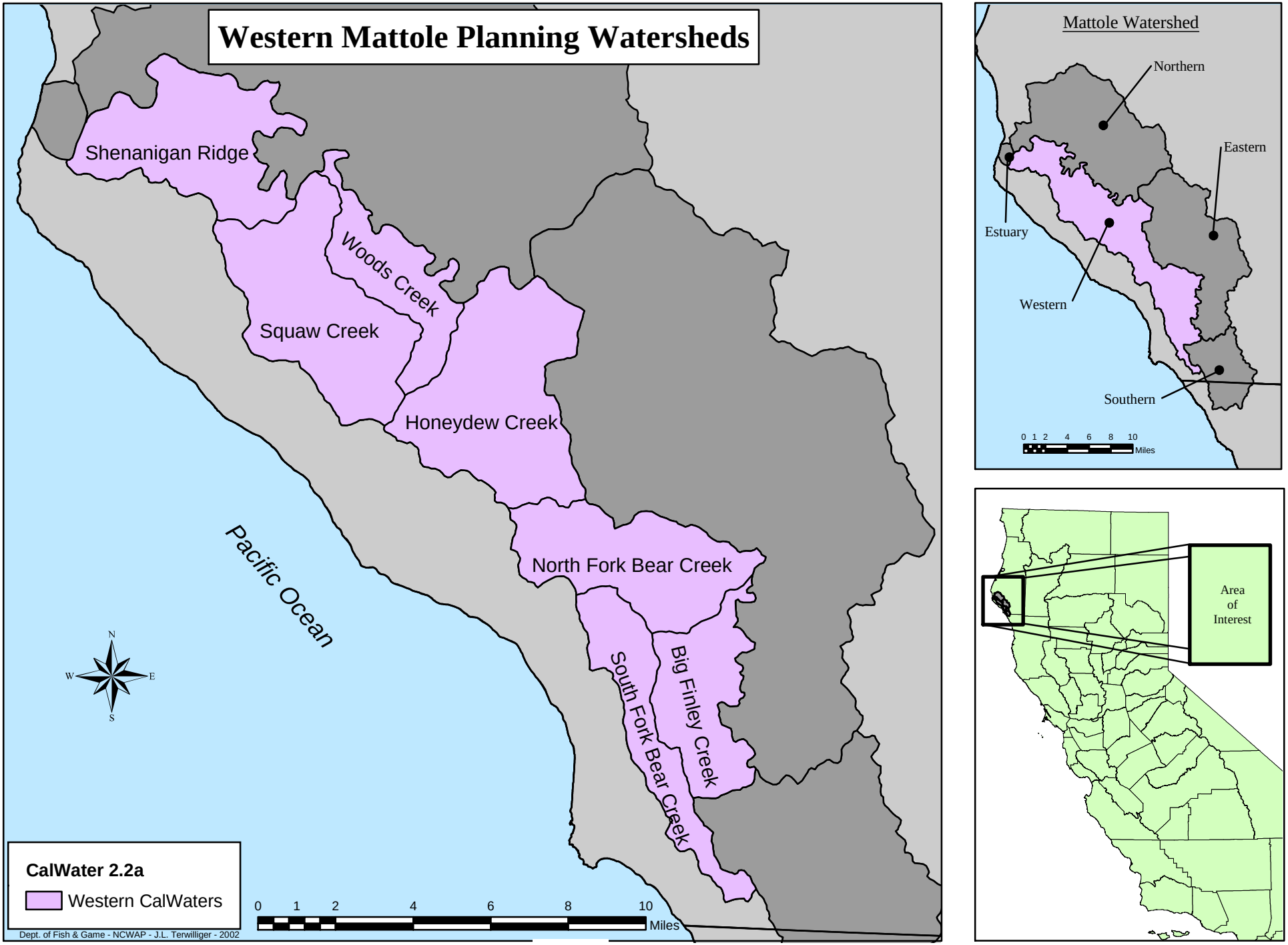
of
Interest


Western Mattole Planning Watersheds
Shenanigan Ridge
Woods Creek
Squaw Creek
Honeydew Creek
North Fork Bear Creek
South Fork Bear Creek
Big Finley Creek
Pacific Ocean
N
W
E
S
CalWater 2.2a
Western CalWaters
0 1 2 4 6 8 10
Miles
Dept. of Fish & Game - NCWAP - J.L. Terwilliger - 2002
Mattole Watershed
Northern
Eastern
Estuary
Western
Southern
0 1 2 4 6 8 10
Miles
Area
of
Interest

Hydrology

The Western subbasin is made up of six complete Calwater Units and most of the Shennanigan Ridge Calwater Unit (see map on the previous page). There are 85.8 perennial stream miles in 30 perennial tributaries in this subbasin (Table 34). Twelve of these tributaries have been inventoried by the DFG. There were 25 reaches, totaling 41.5 miles in the inventory surveys. The inventories included channel and habitat typing, and biological sampling.

Table 34: Surveyed Streams with Estimated Anadromy in the Western Subbasin.

Stream	DFG Survey (Y/N)	DFG Survey Length (miles)	Estimated Anadromous Habitat Length (miles)	Reach	Channel Type
Bear Creek	N		0.3		
Stansberry Creek	N		0.5		
Mill Creek (lower)	Y	1.1	1.4	1	B2
Clear Creek	N		0.7		
Indian Creek	N		1.2		
Wild Turkey Creek	N		0.1		
Green Fir Creek	N				
Squaw Creek	Y	4.1	12.7	1	F3
Granny Creek	N				
Cook Gulch	N				
Saunders Creek	N		0.4		
Hadley Creek	N				
Kendall Gulch	N				
Woods Creek	N		1.5		
Bundle Prairie Creek	N				
Honeydew Creek	Y		5.9		
	Y	1.4		1	F4
	Y	0.9		2	F4
	Y	1.1		3	F3
	Y	0.7		4	A2
Bear Trap Creek	Y		0.1		
	Y	2.9		1	F3
	Y	1.7		2	F2
	Y	1.6		3	B2
	Y	1.1		4	F2
High Prairie Creek	N		0.6		
East Fork Honeydew Creek	Y	2.9	6.0	1	F2
Upper East Fork Honeydew Creek	Y	1.0	0.0	1	F2
West Fork Honeydew Creek	Y	0.7	0.2	1	B2
Bear Creek	Y		6.5		
	Y	1.4		1	B2
	Y	0.3		2	A2
French Creek	N		0.4		
Jewett Creek	N		2.4		
North Fork Bear Creek	Y		4.3		
	Y	2.5		1	B4
	Y	0.9		2	A3
Unnamed Tributary to North Fork Bear Creek	Y	1.4		1	B2
	Y	0.3		2	A2
South Fork Bear Creek	Y		10.7		
	Y	1.9		1	B2

Stream	DFG Survey (Y/N)	DFG Survey Length (miles)	Estimated Anadromous Habitat Length (miles)	Reach	Channel Type
	Y	4.6		2	F3
	Y	5.3		3	B3
	Y	0.3		4	F4
Little Finley	N				
Big Finley	N		0.1		
Nooning	Y		1.5		
	Y	0.1		1	F3
	Y	1.4		2	B2

In their inventory surveys, the DFG crews utilize a channel classification system developed by David Rosgen (1994) and described in the *California Salmonid Stream Habitat Restoration Manual* (Flosi, et al., 1998). Rosgen channel typing describes relatively long stream reaches using eight channel features: channel width, depth, velocity, discharge, channel slope, roughness of channel materials, sediment load and sediment size. There are eight general channel types in the Rosgen classification system.

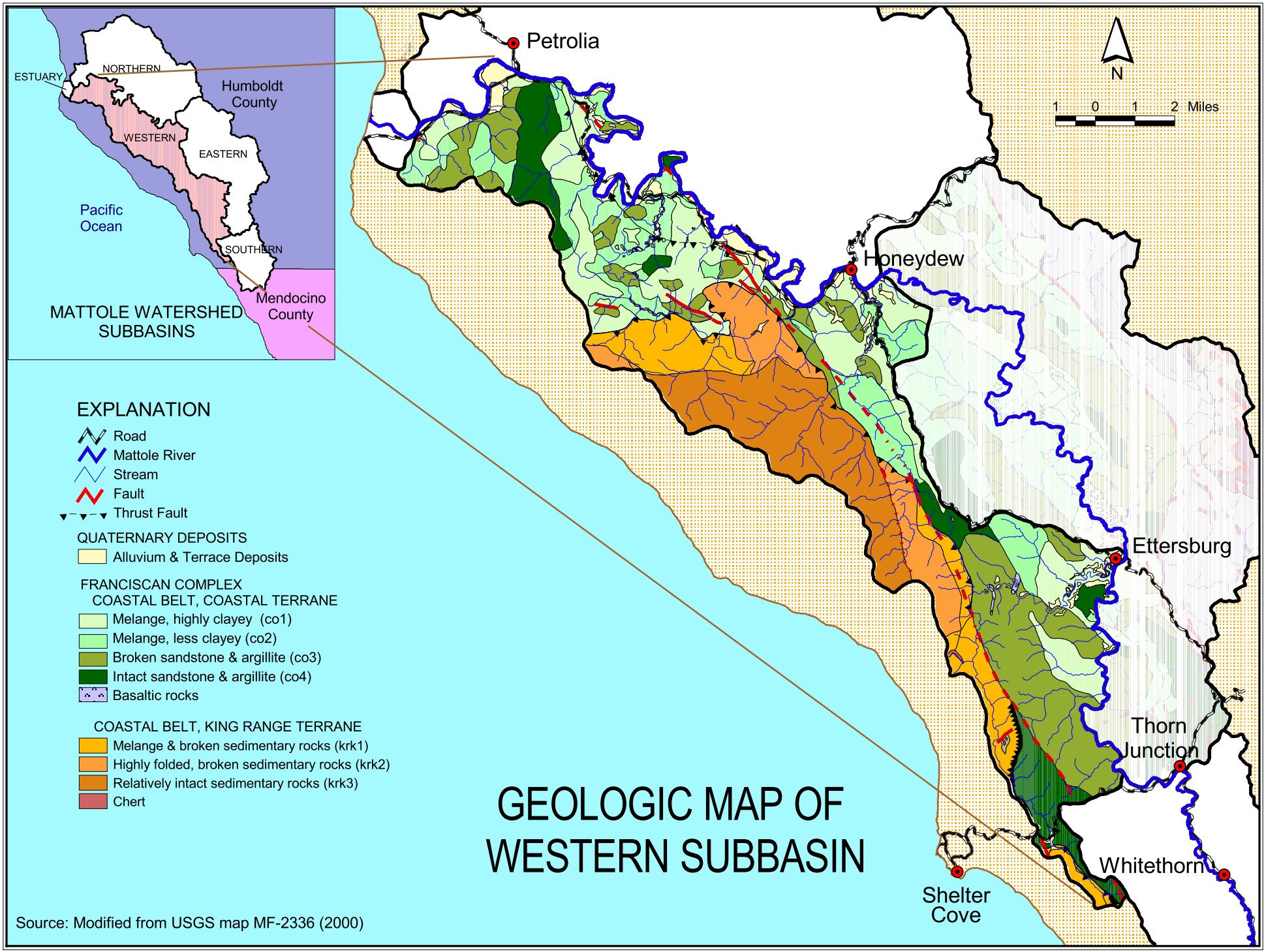
In the Western subbasin, there were two type A channels, totaling 2.2 miles; seven type B channels, totaling 17.3 miles; and 12 type F channels, totaling 21.8 miles. Type A stream reaches are narrow, moderately deep, single thread channels. They are entrenched, high gradient reaches with step/pool sequences. Type A reaches flow through steep V- shaped valleys, do not have well-developed floodplains, and have few meanders. Type B stream reaches are wide, shallow, single thread channels. They are moderately entrenched, moderate to steep gradient reaches, which are riffle-dominated with step/pool sequences. Type B reaches flow through broader valleys than type A reaches, do not have well-developed floodplains, and have few meanders. Type F stream reaches are wide, shallow, single thread channels. They are deeply entrenched, low gradient reaches and often have high rates of bank erosion. Type F reaches flow through low-relief valleys and gorges, are typically working to create new floodplains, and have frequent meanders (Flosi, et al., 1998).

Geology

The geology of the Western subbasin is highly variable but, with respect to slope stability, may by generally characterized as more susceptible to landslides and erosion in the easterly and northerly portions . The Southern portion of the Western subbasin straddles the northwest-trending boundary between the King Range terrane on the west and the Coastal terrane to the east. Both terranes form mostly hard with smaller areas of moderate topography. The Lower North Fork and South Fork of Bear Creek and Lower East Fork of Honeydew Creek are subsequent streams that follow the zone of faulting and shearing associated with the soft to moderate terrain has formed along the structural suture between the two geologic terranes. Large dormant landslide complexes overprinted with more limited active landslides are found in association with the highly sheared bedrock present along these stream reaches. To the west, the dramatic relief, steep slopes and hard terrain of the King Range are a reflection of relatively intact and stable bedrock underlying the middle of the mountain range coupled with rapid, on-going regional uplift. The terrain distribution for the entire Mattole Watershed is presented on maps within the *Mattole Watershed Profile – Geology* section of this report.

The relatively few deep-seated landslides mapped along the eastern flanks of the King Range appear to be dormant. Abundant debris slide slope and inner gorge geomorphic features have been mapped in this area, along with a moderate number of active debris slide scares concentrated adjacent to drainages. West of Honeydew and in the upper reaches of Squaw Creek, bedrock is pervasively disrupted forming soft to moderate terrain along the broad, west-trending Cooskie shear zone that forms the northern boundary of the King Range terrane. The landslide occurrence on the three terrains is presented on maps within the *Mattole Watershed Profile – Geology* section of this report. Large deep-seated landslides, historically active earthflows, and gully erosion on grass-covered highlands have been mapped in association with the weakened bedrock in this area of the subbasin.

Most of the steep, hard terrain is interpreted as having a high to moderate landslide potential based on the extensive areas of debris slide slopes. The moderate terrain is primarily mapped as moderate to high landslide potential with high to very high on the debris slide slopes. The soft terrain is typically mapped as high to very high landslide potential based on the predominance in that area of weak rock and high concentration and density of dormant and active landslides.


ESTUARY
NORTHERN
Humboldt County
WESTERN
EASTERN
SOUTHERN
Pacific Ocean
Mendocino County
MATTOLE WATERSHED SUBBASINS
Petrolia
Honeydew
Ettersburg
Thorn Junction
Whitethorn
Shelter Cove
N
1 0 1 2 Miles
EXPLANATION
Road
Mattole River
Stream
Fault
Thrust Fault
QUATERNARY DEPOSITS
Alluvium & Terrace Deposits
FRANCISCAN COMPLEX
COASTAL BELT, COASTAL TERRANE
Melange, highly clayey (co1)
Melange, less clayey (co2)
Broken sandstone & argillite (co3)
Intact sandstone & argillite (co4)
Basaltic rocks
COASTAL BELT, KING RANGE TERRANE
Melange & broken sedimentary rocks (krk1)
Highly folded, broken sedimentary rocks (krk2)
Relatively intact sedimentary rocks (krk3)
Chert
GEOLOGIC MAP OF WESTERN SUBBASIN
Source: Modified from USGS map MF-2336 (2000)

Vegetation

Unless otherwise noted, the vegetation description in this section is based on manipulation of Calveg 2000 data. This is vegetation data interpreted from satellite imagery by the United States Forest Service, Remote Sensing Lab. The minimum mapping size is 2.5 acres.

Mixed hardwood and conifer forests cover 55% of the area, conifer forest 7%, and hardwood forest 25% for a total of eighty-seven percent forested area. Grassland occupies 10% of the subbasin. Shrub, barren, agricultural lands, and urban classifications together cover the remaining 3% of the area. The forested vegetation reflects the impacts of harvesting. 58% of the Western subbasin is in the 12 to 23.9 inch diameter breast height (dbh) size class. 20% is in a diameter size class greater than 24 inches diameter breast height.

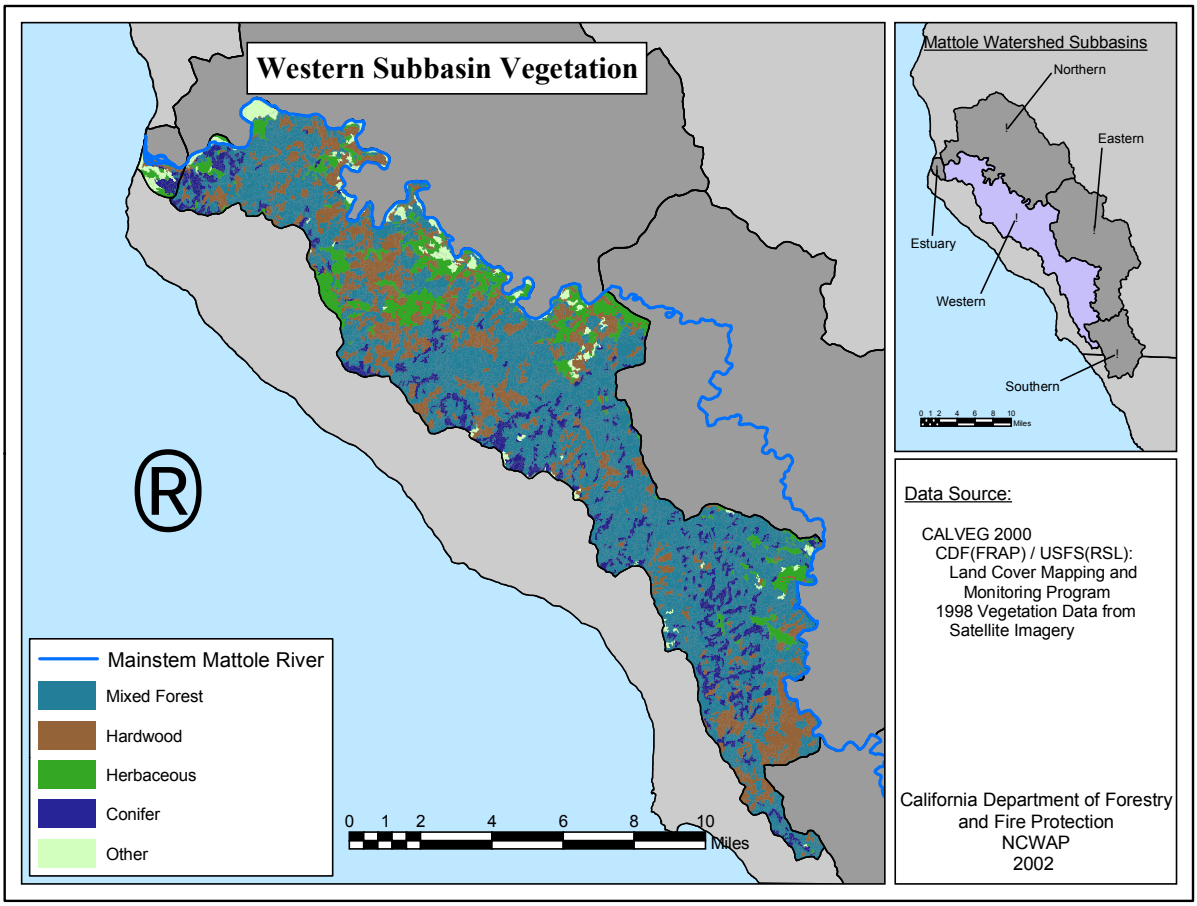


Figure 49: Vegetation of the Western Subbasin.

Land Use

The subbasin is largely in public ownership managed by the Bureau of Land Management (BLM) as part of the King Range National Conservation Area (KRNCA) (Figure 50). The area has a relatively small amount of subdivision. The major land use activity on privately owned land is in ranching and some timber management. Controversy over BLM management and public access to the resources of the KRNCA, both supportive and critical, are ongoing issues. Timber harvest issues have occurred in the past, focused on stands in Honeydew Creek, but now most of timber is now managed for late seral reserve (Table 29). The 220 acre Mill Creek Forest, the last old-growth Douglas fir and tan oak forest in the lower Mattole, is located in the lowest downstream part of this subbasin.

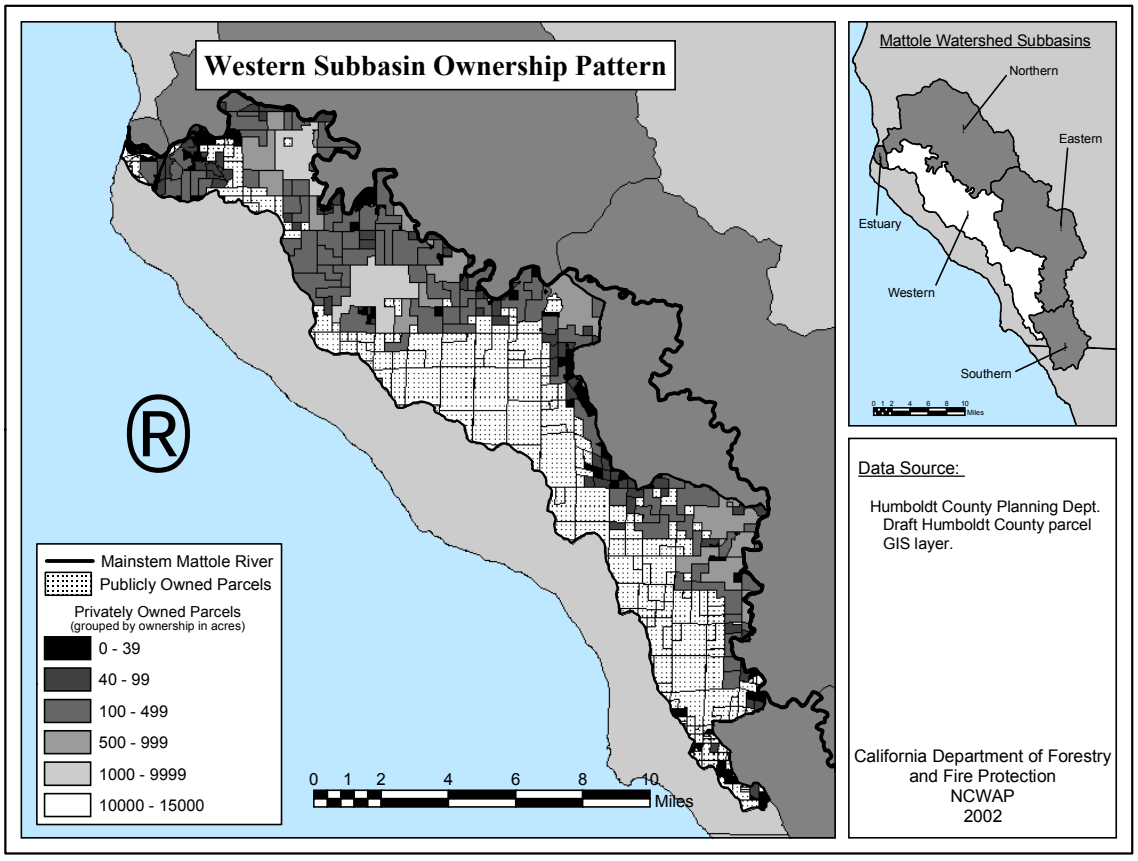


Figure 50: Ownership Pattern of the Western Subbasin.

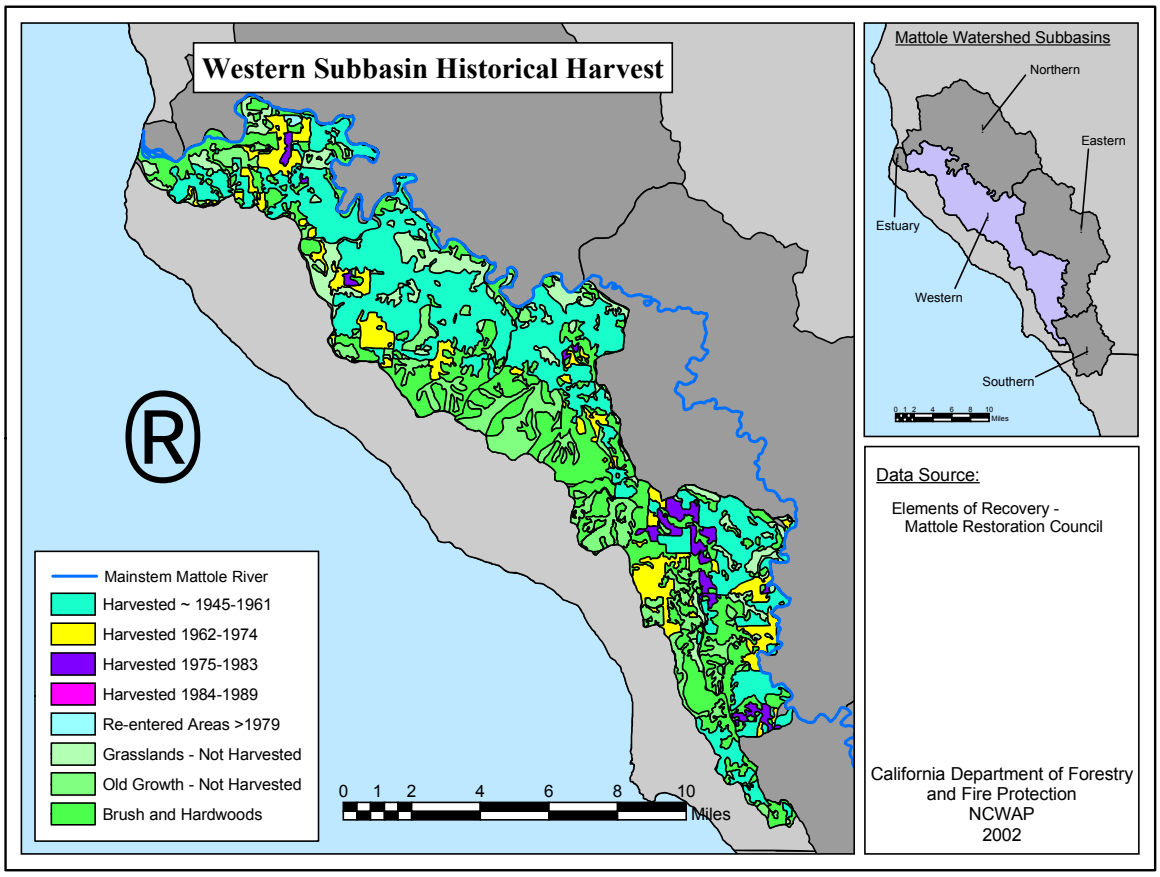


Figure 51: Timber Harvest History for the Western Subbasin.

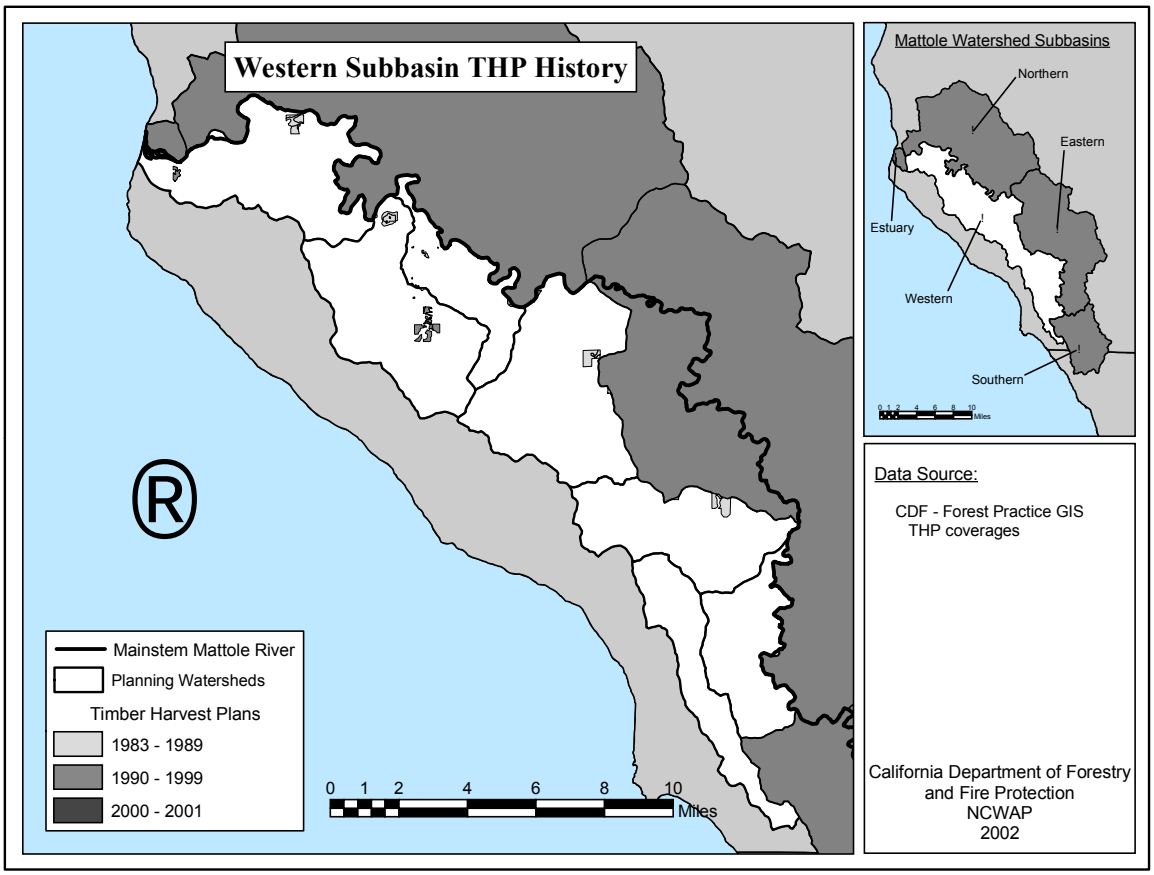


Figure 52: Timber Harvesting Plans 1983-2001, Western Subbasin.

Timber harvest activity was extensive prior to 1961 and steadily decreased as a proportion of land area since.

Table 35: Timber Harvest History, Western Mattole Subbasin.

TIMBER HARVEST HISTORY - WESTERN MATTOLE SUBBASIN		
	Total Acres	Percent of Area
Harvested 1945-1961	20,544	36%
Harvested 1962-1974	5,222	9
Harvested 1975-1983	1,584	3
Harvested 1984-1989	540	1
Harvested 1990-1999	213	<1
Harvested 2000-2001 (partial)	0	0

Fluvial Geomorphology

The fluvial geomorphology of the Western subbasin is characterized by a highly variable percentage of mapped channel characteristics, low number of gullies, and wide ranging lateral bar development. The planning watersheds (PWs) that make up the Western subbasin include: North Fork Bear Creek, South

Fork Bear Creek, Big Finely Creek, Honeydew Creek, Shenanigan Ridge, Squaw Creek and Woods Creek.

Table 36 documents the number of sites and summarizes the lengths of eroding bank features within the Western subbasin. In general, stream bank erosion has been observed within all but one of the planning watersheds within this subbasin. The number of eroding bank sites range from two in the Shenanigan Ridge PW to 11 in the Honeydew Creek PW. The Squaw Creek PW has been mapped with a total length of approximately 1750 meters of eroding bank; about 3 percent of the stream length within the PW.

Table 36: Eroding Stream Bank Lengths - Western Subbasin Planning Watersheds.

Western Subbasin Planning Watersheds	*2000 Photos*			
	Number of Sites w/in PW	Maximum Length (m) of Eroding Bank w/in PW	Total Length (m) of Eroding Bank w/in PW	Approx. % Eroding Bank to Stream Length w/in PW
Bear Creek, No. Fork	6	215	836	2
Bear Creek, So. Fork	0	N.O.	N.O.	N.O.
Big Finely Creek	3	230	471	2
Honeydew Creek	11	180	1253	2
Shenanigan Ridge	2	100	187	<1
Squaw Creek	10	530	1740	3
Woods Creek	4	430	1064	8

N.O.- Not Observed

Table 37 illustrates the range in mapped channel characteristics, gullies, and lateral bar development from 1984 and 2000 aerial photographs. In general, the 1984 air photos for the subbasin reveal the variable nature of mapped channel characteristics which range from 80 to less than 10 percent of the overall channel length; gullies range from 10 to less than 2 percent of the overall containing area; and lateral bar development ranges from intermediate to high values within subreach lengths. However, the 2000 air photos reveal that six of the seven PWs within the Western subbasin have shown a significant decrease in mapped channel characteristics, with no significant change in the number of gullies. Furthermore, two PWs, Big Finely and Squaw Creeks, have shown notable decreases in lateral bar development, which suggest decreases in excess sediment.

Table 37: Fluvial Geomorphic Features - Southern Mattole Subbasin.

	2000 Photos			**1984 Photos**		
Planning Watersheds	% Disturbed Channel [1]	% Gullies [2]	Lateral Bar Development [3]	% Disturbed Channel [1]	% Gullies [2]	Lateral Bar Development [3]
Bear Creek, North Fork	<10-50	2-5	2-3	<50-80	<2	3-4
Bear Creek, South Fork	<10	2-5	1-2	10-25	<2	2-3
Big Finely Creek	5-10	2-5	1-2	25-40	<2	3-4

	2000 Photos			1984 Photos		
Planning Watersheds	% Disturbed Channel [1]	% Gullies [2]	Lateral Bar Development [3]	% Disturbed Channel [1]	% Gullies [2]	Lateral Bar Development [3]
Honeydew Creek	<10-50	<5-10	3	<50-75	<5	3-4
Shenanigan Ridge	15-25	<2	2-3	<10-25	<2	1-2
Squaw Creek	<10-25	5-10	2	<50-80	<5-10	3-4
Woods Creek	<10	5	2-3	<10-40	<2	3

All values are visual approximations at this stage and subject to change as GIS data becomes available.

[1] Features include: lack of riparian vegetation, distribution and number of lateral or mid-channel bars, multi-thread channels, cut-off chutes, channel bank erosion, and shallow landslides adjacent to or blocking channels.

[2] Gullies include those that appear active, have little to no vegetation within the incised area, and are of sufficient size to be identified on aerial photos.

[3] Lateral bars include mappable lateral, mid-channel bars and reflect sediment supply and storage. Rankings range from 1-5. Higher values suggest excess sediment

The Western subbasin displays a similar trend with the Eastern subbasin in that there have been significant decreases in mapped channel characteristics between 1984 and 2000. The exception to this trend is found in the Shenanigan Ridge PW which has shown no significant change and has had relatively low values since 1984. Areas with a historically high percentage of mapped channel characteristics include portions of the Honeydew Creek, Squaw Creek, and North Fork Bear Creek PWs. However, the Squaw Creek PW has displayed a decrease in the highest mapped channel characteristics values from 80 percent to 25 percent between 1984 and 2000. Likewise, the North Fork Bear Creek PW is important to note because it has shown over a 40 percent decrease in mapped channel characteristics, along certain reaches, during this same period.

Aquatic/Riparian Conditions

Unless otherwise noted, the vegetation description in this section is based on manipulation of Calveg 2000 data. This is vegetation data interpreted from satellite imagery by the United States Forest Service, Remote Sensing Lab. The minimum mapping size is 2.5 acres.

Vegetation within 150 feet of the centerline of streams is 58% mixed conifer and hardwood forest, 16% hardwood, and 15% conifer forest. One percent of the forest type is riparian hardwoods while another one percent is hardwood occupied commercial timberland site. The barren classification makes up 5 % of the riparian area, all of it adjacent to the Mattole River. Annual grassland is 3% of the area, while shrubs, water, and agricultural lands comprise the remaining 2%. Sixty-six percent of the riparian area is covered by trees in the 12 to 23.5 inch diameter size class. The area occupied by this single-width zone is 13% of the total Western Subbasin acreage.

Fish Habitat Relationship

This subbasin supports populations of chinook and coho salmon, and steelhead. In 2001, the DFG coho project snorkel surveys found coho salmon in two subbasin tributaries. Coho have been observed in five other tributaries in recent years by the DFG Restoration staff. Most tributaries support strong, multi-year class juvenile steelhead rearing populations based upon recent DFG stream surveys. Most

tributaries have favorable summer water temperatures for summer rearing habitat, and adult spawning conditions are variable but generally favorable.

Fish History and Status

Historically, the Western Subbasin supported runs of chinook salmon, coho salmon, and steelhead trout. Interviews with local residents indicate that coho salmon and steelhead trout have been found in the Lower Bear Creek, Stansberry Creek, Clear Creek, Indian Creek, Squaw Creek, and Woods Creek; and chinook salmon have been found in Stansberry Creek, Indian Creek, Squaw Creek, and Woods Creek (Coastal Headwaters Association 1982). DFG stream surveys before 1970 found steelhead trout in 15 streams, unidentified salmonids in six streams, and coho salmon in Lower Mill Creek, Clear Creek, Woods Creek, Bear Trap Creek, and Bear Creek. High densities of steelhead trout were estimated by DFG for the South Fork of Bear Creek and Indian Creek (200-300 per 100 feet of stream) in 1966.

A study of the standing stock of Mattole Basin salmonids conducted in July and August 1972 (Brown, 1973b) examined Squaw Creek near its mouth. The steelhead trout density was 74 fish per 100 feet of stream.

BLM, Coastal Headwaters Association, MSG, and DFG stream surveys have continued to document the presence of steelhead trout in most streams in the Western Subbasin over time. BLM surveys in the 1970s and early 1980s found juvenile steelhead trout in seven streams. Coastal Headwaters Association surveys in 1981 and 1982 found steelhead trout in ten streams. MSG carcass surveys found steelhead trout in Lower Mill Creek, Honeydew Creek, Bear Creek, and the South Fork of Bear Creek in the late 1990s. DFG surveys found steelhead trout in Squaw Creek, Bear Trap Creek, the East Fork of Honeydew Creek, and Jewett Creek in the 1980s and nine streams in the 1990s.

Unidentified salmonids were found in Indian Creek, Squaw Creek, the Upper East Fork of Honeydew Creek, Jewett Creek, and Nooning Creek by DFG in the 1980s. These could have been chinook or coho salmon. In addition, coho salmon were detected in Lower Mill Creek and Bear Creek in 1990s by DFG stream surveys, and in Big Finley Creek in 1995 by the Redwood Sciences Lab. MSG carcass surveys found coho salmon in Bear Creek and the South Fork of Bear Creek in the late 1990s and early 2000s. DFG electrofishing in the 1990s also found coho salmon in Lower Mill Creek, the North Fork of Bear Creek, and the South Fork of Bear Creek. A 1997-99 Redwood Sciences Laboratory study of juvenile coho salmon distributions in relation to water temperatures in the Mattole Basin (Welsh et al. 2001) found coho salmon in Big Finley Creek and the South Fork of Bear Creek. The 2001 DFG Coho Inventory found coho salmon in Lower Mill Creek, Woods Creek, and Honeydew Creek. More detailed summaries of stream surveys and fisheries studies in the Western Subbasin are provided in the DFG Appendix.

Fish Passage Barriers

Nine stream crossings were surveyed in the Western Subbasin as a part of the Humboldt County culvert inventory and fish passage evaluation conducted by Ross Taylor and Associates (2000). Lighthouse Road near Petrolia has culverts on Bear Creek, Mill Creek, Stansberry Creek, and Titus Creek; the Mattole Road between Petrolia and Honeydew has culverts on Clear Creek, Granny Creek, Indian Creek and Saunders Creek; and Wilder Ridge Road has a culvert on High Prairie Creek. The culverts on Bear Creek, Clear Creek, High Prairie Creek, Stansberry Creek, and Titus Creek were found to be total salmonid barriers and the culverts on Indian Creek and Saunders Creek were found to be partial salmonid barriers (Table 38: ***Taylor, 2000; G. Flosi, Personal Communication***). The culverts on Granny Creek and Mill Creek were found to be temporary and partial salmonid barriers. In a list of priority rankings of 67 culverts in Humboldt County for treatment to provide unimpeded salmonid passage to spawning and rearing habitat, rankings of culverts in the Western Subbasin ranged from 5 for Stansberry Creek to 64 for Granny Creek. Criteria for priority ranking included salmonid species diversity, extent of barrier present, risk of culvert failure, current culvert condition, salmonid

habitat quantity, salmonid habitat quality, and a total salmonid habitat score. The culvert on Mill Creek is scheduled for improvements in 2002, the culvert on Clear Creek was improved in 2001, the culvert on Stansberry Creek was proposed and scheduled for improvement in 2001 but funding ran out, and the culvert on Saunders Creek is currently proposed for improvement (G. Flosi, personal communication).

Table 38: Culverts Surveyed for Barrier Status in the Western Subbasin.

Stream Name	*Road Name*	*Priority Rank*	*Barrier Status*	*Upstream Habitat*	*Treatment*
Bear Creek	Lighthouse Road	15	Total barrier. Excessive under sizing probably creates a velocity barrier.	0.3 miles of potential salmonid habitat.	None proposed at this time
Clear Creek	Mattole Road	7	Total barrier. An extremely steep gradient creates a total velocity barrier. Parallel steel tracks probably contribute to passage problems by increasing velocities, as they have minimal roughness, and interfering with a fish's swimming motion.	0.7 miles of good salmonid habitat.	Improved in 2001
Granny Creek	Mattole Road	64	Temporary and partial barrier. This culvert is a partial/temporary barrier for adult steelhead (only 20% passable) and a complete barrier for adult coho and all juveniles. Water levels are too shallow at low flows, and excessive velocities exist at higher flows. Both excessive slope and the long length of the culvert cause passage problems.	0.7 miles of poor salmonid habitat.	None proposed at this time
High Prairie Creek	Wilder Ridge Road	50	Total barrier. The culvert is a complete barrier for all adults and juveniles. Water levels are too shallow at low flows, and excessive velocities exist at higher flows. Both excessive slope and a smooth floor cause passage problems. The baffles are poorly installed, and flow is turbulent and fast during even moderate runoff. The outlet pool is not deep enough for salmonids to jump into the culvert.	1.4 miles of poor salmonid habitat.	None proposed at this time
Indian Creek	Mattole Road	13	Partial barrier. Partial barrier for adults, nearly complete barrier for juveniles. Water levels are too shallow at low flows, and excessive velocities exist at higher flows. Direct observation of juveniles suggests that the entry jump and flow velocities were problems. Kingfishers were observed at the outlet pool when juvenile steelhead were jumping.	1.2 miles of good salmonid habitat.	None proposed at this time
Mill Creek	Lighthouse Road	20	Temporary and partial barrier. A temporary barrier for adults. Excessive velocities at higher migration flows exist. A barrier for juveniles. An excessive jump is required to enter the culvert and velocities appear excessive even with baffles.	1.35 miles of good salmonid habitat.	Funded and scheduled for improvement in 2002
Saunders Creek	Mattole Road	16	Partial barrier. Partial barrier for adult steelhead (only 24% passable) and a complete barrier for adult coho and all juveniles. Water levels are too shallow at low flows and excessive velocities exist at higher flows. Both excessive slope and a smooth floor cause passage problems. Juveniles were observed failing to swim even several feet up the culvert due to velocity. Measured velocities were 10-12 ft per second during a low-moderate winter migration flow.	0.7 miles of fair salmonid habitat.	Proposed for improvement
Stansberry Creek	Lighthouse Road	5	Total barrier. An excessive jump is required to enter the culvert, while there is a lack of depth to execute such a jump. A steep gradient and excessive under sizing creates a velocity barrier.	0.7 miles of potential salmonid habitat.	Proposed and Funded for improvement in 2001, but lack of funding postponed improvements
Titus Creek	Lighthouse Road	46	Total barrier. Steep gradient, length and excessive under sizing create a velocity barrier.	0.4 miles of poor salmonid habitat.	None proposed

Habitat Summary

The Western Subbasin EMDS evaluations were determined by calculating a mean, area weighted watershed condition value from the Shenanigan Ridge, Squaw Creek, Woods Creek, Honeydew Creek, North Fork Bear Creek, South Fork Bear Creek, and Big Finley Creek Calwater 2.2 Units. The evaluation results of each subbasin are presented in the EMDS section of the Mattole River Watershed Profile. The overall conditions of the Calwater 2.2 Units were determined by the results of the following level one network factors:

- Passage Barriers (currently with no data in this subbasin)
- Upland Condition
- Road Condition
- Stream Condition

Evaluating the suitability of each of these four watershed condition factors that affect salmon and steelhead provides the degree of subbasin suitability for the fish. The condition of each of these factors, in turn, is determined by evaluating the suitability of the many watershed condition variables that affects it. In all, there are four nested tier levels in the EMDS suitability analysis system. The EMDS system is not predictive, but rather functions as a dynamic filing system to isolate and evaluate the many detailed variables operating in a watershed. These variables are combined in the system much like they interact in the watershed itself.

Each individual variable at level four, the deepest tier, is assigned an evaluation rating between –1 (fully unsuitable) and +1 (fully suitable) compared to known standards that produce conditions that are either good or bad for salmonids. These condition values are passed up through the network according to their power to develop, restrict, or over-ride conditions affecting fish population health. For example, water is the most restrictive variable for fish. Regardless of suitable conditions for other factors like shade canopy, clean gravel, large woody debris, and pool depth, a lack of water over-rides those good conditions and makes the overall result unsuitable for fish. The arrangement of the factors in the system and the way they are combined allows this sort of variable interaction. This functional model provides analysts the capacity for orderly assessment of the watershed's condition. (Figure 5, page 43). Network details are described in Appendix **A** and maps showing EMDS results are provided in Appendix **B**.

The system can be structured to operate with watersheds of various scales from basin level to stream reaches. NCWAP operated the system at the basin, subbasin, Calwater planning watershed, and stream reach scales. Regardless of scale or the ultimate suitability rating an assessment produces, the system allows for backtracking to find the factors that have affected the suitability rating. As such, the system is useful for the identification of watershed improvement opportunities. It is also good at identifying areas of refugia and resources that need protective measures during land use activities.

The system evaluates conditions at a particular moment in time and is static in its analysis. However, it also can be useful for recording changes in watershed factor conditions as discovered through new field assessments or a series of monitoring activities. Changes in suitability of conditions for fish due to both natural processes and restoration efforts can be evaluated in this fashion. Multiple system "runs" over time can therefore document change and be useful for trend analysis. Thus, the ultimate "suitability" ratings are somewhat secondary in importance to the utility of the system for detailed watershed factor condition assessment, diagnostics, and development of recommendations for watershed improvement activities.

The overall watershed condition rating from the EMDS model was moderately unsuitable for the Western Subbasin. Watershed conditions in the seven Calwater Units ranged from somewhat unsuitable in the South Fork Bear Creek, Squaw Creek, Big Finley Creek and Honeydew Creek

Calwater Units to fully unsuitable in the Woods Creek and Shenanigan Ridge Calwater Units (Table 39).

Data on fish passage barriers has not yet been incorporated into EMDS. However, this data is presented in the Fish Passage Barriers section of the Western Subbasin Overview. Culverts on Bear Creek, Clear Creek, High Prairie Creek, Stansberry Creek, and Titus Creek were found to be total salmonid barriers and culverts on Indian Creek and Saunders Creek were found to be partial salmonid barriers (Table 39). Culverts on Granny Creek and Mill Creek were found to be temporary and partial salmonid barriers. The culvert on Bear Creek is in the North Fork Bear Creek Calwater Unit and the culvert on High Prairie Creek is in the Honeydew Creek Calwater Unit. The culverts on Clear Creek, Stansberry Creek, Titus Creek, Indian Creek, and Mill Creek are in the Shenanigan Ridge Calwater Unit and the culverts on Saunders Creek and Granny Creek are in the Woods Creek Calwater Unit.

Upland condition in the Western Subbasin was rated somewhat unsuitable by EMDS. All Calwater Units in the Subbasin had either somewhat or moderately unsuitable upland conditions. Fully suitable ratings for early seral were balanced by moderately to fully unsuitable ratings for upland cover and canopy in all Calwater Units. Land use ratings ranged from moderately suitable to moderately unsuitable and slope stability ratings ranged from somewhat suitable to moderately unsuitable.

Road condition in the Western Subbasin was rated somewhat suitable by EMDS. Road condition ratings ranged from moderately suitable in the Squaw Creek and Big Finley Creek Calwater Units to moderately unsuitable in the Shenanigan Ridge Calwater Unit. Road use was undetermined in all Calwater Units while ratings road density unstable ranged from fully suitable to somewhat unsuitable. Ratings for stream crossings, road density by hillslope position, and road proximity ranged widely.

Stream condition in the Western Subbasin was rated moderately unsuitable by EMDS. Data on water temperature and stream flow have not yet been incorporated into EMDS. However, water temperature data is presented in the North Coast Water Quality Control Board Appendix and stream flow data is presented in the Department of Water Resources Appendix and in individual stream survey report summaries (Appendix X). Temperature records were available for Mill Creek and Stansberry Creek in the Shenanigan Ridge Calwater Unit; Squaw Creek in the Squaw Creek Calwater Unit; Honeydew Creek, the Lower SF Honeydew Creek, WF Honeydew Creek, and the Upper EF Honeydew Creek in the Honeydew Creek Calwater Unit; Bear Creek, NF Bear Creek, and the LNF Bear Creek in the North Fork Bear Creek Calwater Unit; SF Bear Creek in the South Fork Bear Creek Calwater Unit; and Big Finley Creek and Nooning Creek in the Big Finley Creek Calwater Unit. Except for Mill Creek during 1996, 1999, and 2001, Stansberry Creek during 1999 and the borderline ± 60 ^{o}F in the Lower North Fork Bear Creek during 1996 and 2001, and Big Finley Creek in 1999 all Western Subbasin tributaries sampled had temperatures that exceeded the fully supportive 50 - 60 ^{o} F MWAT range considered suitable for optimal salmonid survival from 1996-2001. Riparian ratings ranged from moderately suitable in the Big Finley Creek Calwater Unit to fully unsuitable in the Woods Creek and Shenanigan Ridge Calwater Units. Reach condition was somewhat unsuitable in all Calwater Units.

Table 39: EMDS Suitability Ratings for the Western Subbasin by CalWater 2.2 Unit.

In the Mattole Basin, the Ecological Management Decision Support system (EMDS) evaluated four main condition factors:

Passage Barriers,

Upland Condition,

Road Condition,

and **Stream Condition**. Of these, Upland, Road, and Stream Condition values are products of several condition factors, which are also listed in Table X. Finally, all four main factors are combined to produce an **Overall Watershed Condition** value. Please refer to a detailed explanation of EMDS on page 37.

Key:

+++	Fully suitable
++	Moderately suitable
+	Somewhat suitable
U	Undetermined
-	Somewhat unsuitable
--	Moderately unsuitable
---	Fully unsuitable

Condition Factor \ Watershed Unit	Western Subbasin	North Fork Bear Creek	South Fork Bear Creek	Squaw Creek	Woods Creek	Big Finley Creek	Shenanigan Ridge	Honeydew Creek
Passage Barriers	**U**	**U**	**U**	**U**	**U**	**U**	**U**	**U**
Upland Cover	**- -**	**- - -**	**- -**	**- - -**	**- - -**	**- - -**	**- - -**	**- -**
Canopy	**- -**	**- - -**	**- -**	**- - -**	**- - -**	**- - -**	**- - -**	**- -**
Early Seral	**+++**	**+++**	**+++**	**+++**	**+++**	**+++**	**+++**	**+++**
Slope Stability	**-**	**-**	**- -**	**- -**	**+**	**- -**	**- -**	**- -**
Land Use	**-**	**+**	**++**	**-**	**- -**	**+**	**-**	**+**
Upland Condition	**-**	**-**	**-**	**- -**	**-**	**- -**	**- -**	**- -**
Road Use	**U**	**U**	**U**	**U**	**U**	**U**	**U**	**U**
Stream Crossings	**-**	**-**	**- -**	**+**	**+**	**+++**	**- -**	**-**
Road Density By Hillslope Position	**-**	**+**	**-**	**++**	**- - -**	**+++**	**- - -**	**-**
Road Density Unstable	**++**	**+++**	**++**	**+++**	**+++**	**+++**	**-**	**+++**
Road Proximity	**-**	**+**	**- - -**	**++**	**-**	**+**	**- - -**	**-**
Road Condition	**+**	**+**	**-**	**++**	**-**	**++**	**- -**	**+**
Water Temperature	**U**	**U**	**U**	**U**	**U**	**U**	**U**	**U**
Stream Flow	**U**	**U**	**U**	**U**	**U**	**U**	**U**	**U**
Riparian	**- -**	**- -**	**+**	**-**	**- - -**	**++**	**- - -**	**-**
Reach Condition	**-**	**-**	**-**	**-**	**U**	**-**	**-**	**-**
Stream Condition	**- -**	**- -**	**-**	**-**	**- - -**	**-**	**- - -**	**-**
Overall Watershed Condition	**- -**	**- -**	**-**	**-**	**- - -**	**-**	**- - -**	**-**

Reach condition was assessed by EMDS using stream attributes such as canopy cover, embeddedness, percent pools, pool depth, and pool shelter. These attributes were collected in 13 streams in the Eastern Subbasin by DFG (see Appendix X for stream survey report summaries). Mill Creek is in the Shenanigan Ridge Calwater Unit and Squaw Creek is in the Squaw Creek Calwater Unit. Honeydew Creek, WF Honeydew Creek, EF Honeydew Creek, Upper NF Honeydew Creek, and Bear Trap Creek are in the Honeydew Creek Calwater Unit. Bear Creek, NF Bear Creek, Unnamed Tributary to Bear Creek, and Jewett Creek are in the North Fork Bear Creek Calwater Unit. Nooning Creek is in the Big Finley Calwater Unit and SF Bear Creek is in the South Fork Bear Creek Calwater Unit.

Stream attributes tend to vary with stream size. For example, larger streams generally have more open canopy and deeper pools than small streams. This is partially a function of wider stream channels and greater stream energy due to higher discharge during storms. Surveyed streams in the Eastern Subbasin ranged in drainage area from 1.2 to 21.7 square miles (Figure 53).

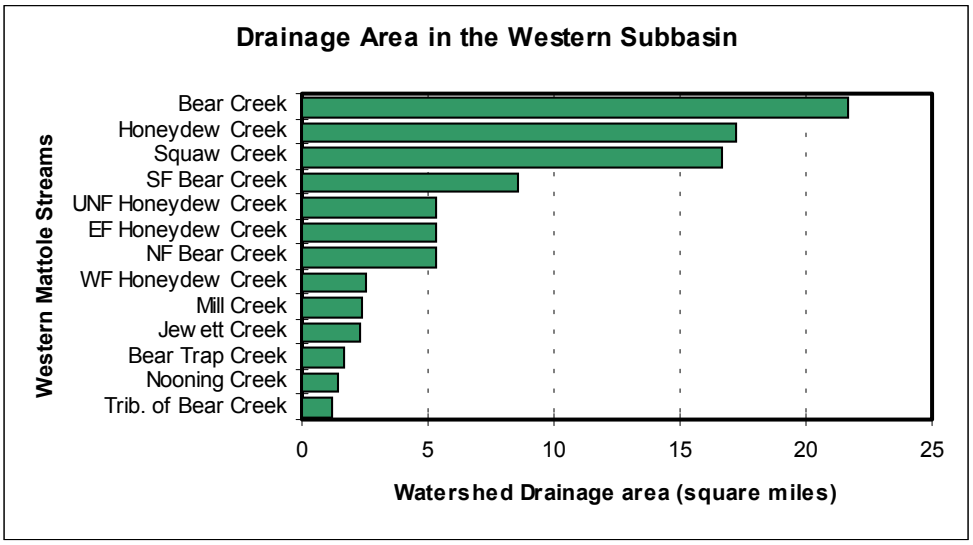


Figure 53: Drainage Area of Stream Surveyed by DFG in the Western Subbasin.

Canopy cover, and relative canopy cover by coniferous versus deciduous trees were measured at each habitat unit during DFG stream surveys. Near-stream forest density and composition contribute to microclimate conditions that help regulate air temperature, which is an important factor in determining stream water temperature. Furthermore, canopy levels provide an indication of the potential present and future recruitment of large woody debris to the stream channel, as well as the insulating capacity of the stream and riparian areas during winter.

In general, the percentage of stream canopy cover increases as drainage area, and therefore channel width, decrease. Deviations from this trend in canopy may indicate streams with more suitable or unsuitable canopy relative to other streams of that subbasin. As described in the EMDS response curves, total canopy (sum of conifer and deciduous canopy) exceeding 85% is considered fully suitable, and total canopy less than 50% is fully unsuitable for contributing to cool water temperatures that support salmonids. The surveyed streams of the Western Subbasin show percent canopy levels (45%-90% total canopy) that vary in their EMDS rating from completely unsuitable to completely suitable (Figure 54). Canopy conditions generally trend with stream size, but the South Fork Bear Creek, Mill Creek, and Nooning Creek have exceptionally high total canopy cover, while a tributary to Bear Creek, and Bear Trap Creek have exceptionally low total canopy cover. Deciduous trees in this subbasin dominate existing canopy.

Cobble embeddedness was measured at each pool tail crest during DFG stream surveys. Cobble embeddedness is the percentage of an average sized cobble piece at a pool tail out that is embedded in fine substrate. Category 1 is 0-25% embedded, Category 2 is 26-50% embedded, 51-75% Category 3 is embedded, Category 4 is 76-100% embedded, and Category 5 is unsuitable for spawning due to factors other than embeddedness. Cobble embedded deeper that 51% is not within the fully supported range for successful use by salmonids. The EMDS Reach Model considers cobble embeddedness greater than 50% to be somewhat unsuitable and 100% to be fully unsuitable for the survival of salmonid eggs and embryos. Embeddedness values in the Western Subbasin are somewhat unsuitable or worse for the survival of developing salmonid eggs and embryos with the exception of Bear Creek and its tributaries where somewhat suitable conditions do exist (Figure 55). Figure 55 also illustrates how stream reaches rated as unsuitable overall may actually have some suitable spawning gravel sites distributed through the stream reach.

Pool, flatwater, and riffle habitat units observed were measured, described, and recorded during DFG stream surveys. During their life history, salmonids require access to all of these types of habitat. EMDS does not evaluate the ratio of these habitat types, but a balanced proportion is desirable. Most surveyed Western Subbasin streams have less than 20% pool habitat by length (Figure 56). This is well below the range considered fully suitable as described below. Dry units were also measured, and obviously indicate poor conditions for fish.

Pool depths were measured during DFG surveys. The amount of primary pool habitat of sufficient depth to be fully suitable for anadromous salmonids is considered in the EMDS Reach Model. Primary pools are determined by a range of pool depths, depending on the order (size) of the stream. Generally, a reach must have 30 – 55% of its length in primary pools for its stream class to be in the suitable ranges (EMDS Table 4). Generally, larger streams have deeper pools. Deviations from the expected trend in pool depth may indicate streams with more suitable or unsuitable pool depth conditions relative to other streams of that subbasin. The frequency of deeper pools in the Western Subbasin (Figure 57) yields EMDS ratings that vary from fully suitable to fully unsuitable. Pool depth is generally higher than for any other Mattole subbasin.

Pool shelter was measured during DFG surveys. Pool shelter rating illustrates relative pool complexity, another component of pool quality. Ratings range from 0-300. The Stream Reach EMDS model evaluates pool shelter to be fully unsuitable if less than a rating of 30. The range from 100 to 300 is fully suitable. The pool shelter ratings in the Western Subbasin yield EMDS results that vary from fully suitable to fully unsuitable (Figure 58).

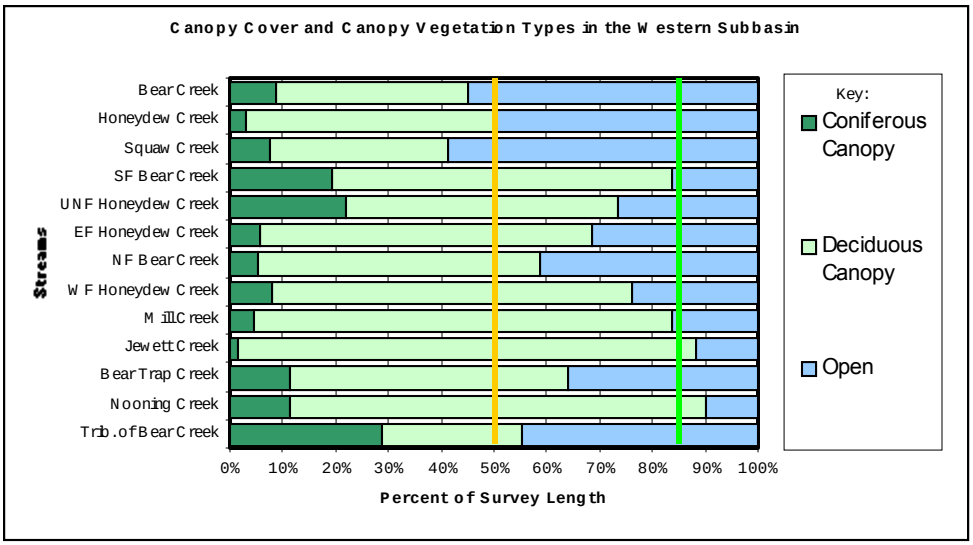


Figure 54: The Relative Percentage of Coniferous, Deciduous, and Open Canopy Covering Surveyed Streams, Western Subbasin.

Averages are weighted by unit length to give the most accurate representation of the percent of a stream under each type of canopy. Streams are listed in descending order by drainage area (largest at the top). As described in the EMDS response curves, total canopy (sum of conifer and deciduous canopy) exceeding 85% (green line) is considered fully suitable, and total canopy less than 50% (yellow line) is fully unsuitable for contributing to cool water temperatures that support salmonids.

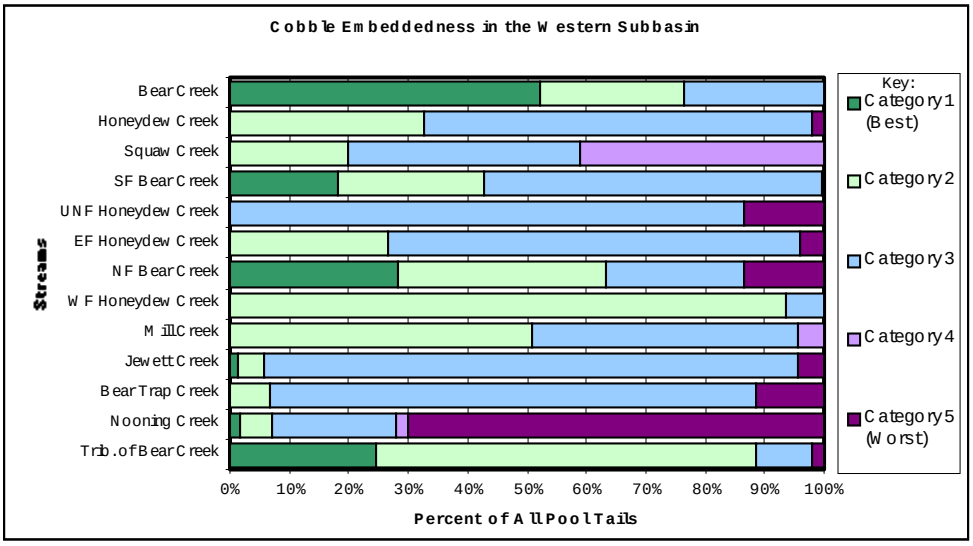


Figure 55: Cobble Embeddedness Categories as Measured at Every Pool Tail Crest in Surveyed Streams, Western Subbasin.

Cobble embeddedness is the % of an average sized cobble piece at a pool tail out that is embedded in fine substrate: Category 1 = 0-25% embedded, Category 2 = 26-50% embedded, Category 3 = 51-75% embedded, Category 4 = 76-100%, and Category 5 = unsuitable for spawning due to factors other than embeddedness (e.g. log, rocks). Substrate embeddedness Categories 3, 4, and 5 are considered by EMDS to be somewhat unsuitable to fully unsuitable for the survival of salmonid eggs and embryos. Streams are listed in descending order by drainage area (largest at the top).

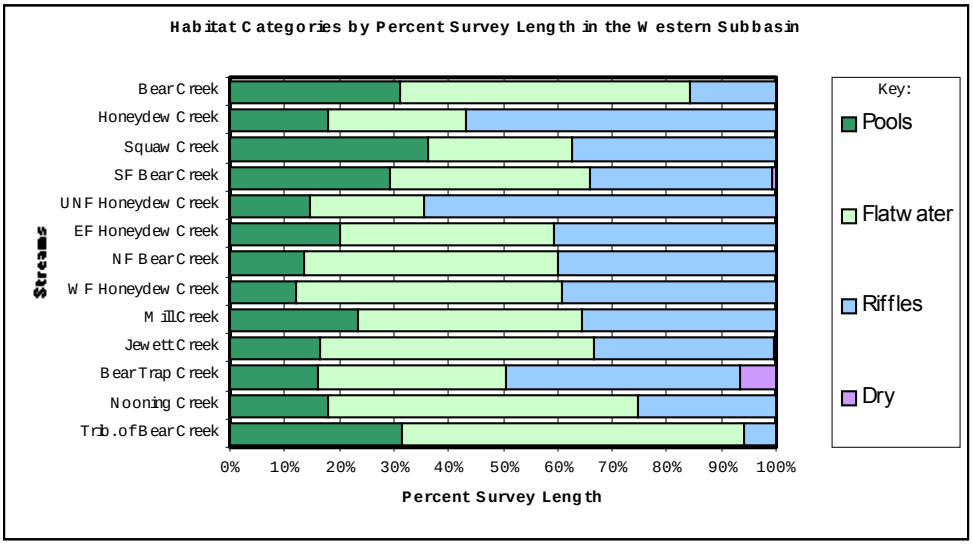


Figure 56: The Percentage of Pool Habitat, Flatwater Habitat, Riffle Habitat, and Dewatered Channel by Survey Length, Western Subbasin.

EMDS does not evaluate the ratio of these habitat types, but a balanced proportion is desirable. Streams are listed in descending order by drainage area (largest at the top).

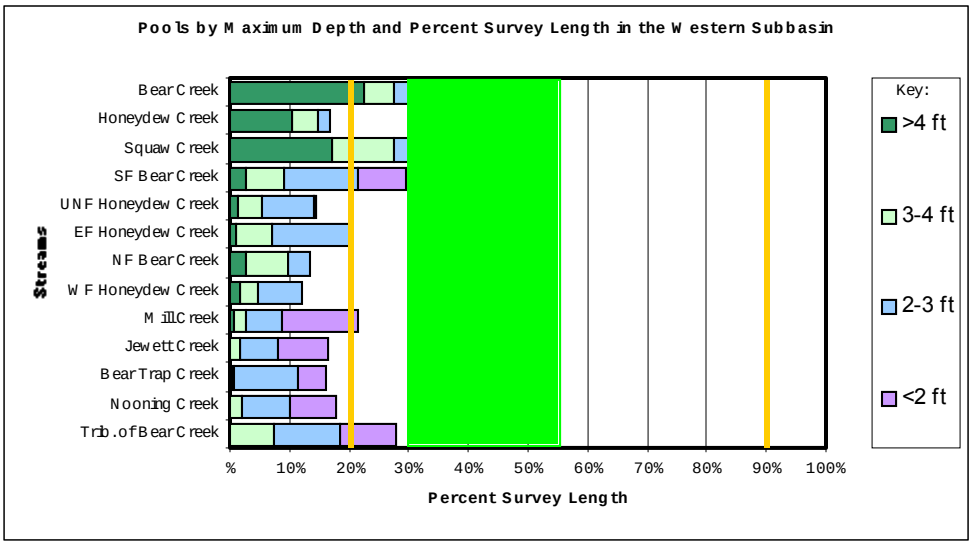


Figure 57: Percent Length of a Survey Composed of Deeper, High Quality Pools, Western Subbasin.

Values sum to the length of percent pool habitat in Figure 56. As described in the EMDS response curves, a stream must have 30-55% (green area) of its length in primary pools to provide stream conditions that are fully suitable for salmonids. Streams with <20 % or >90% (yellow lines) of their length in primary pools provide conditions that are fully unsuitable for salmonids. Streams are listed in descending order by drainage area (largest at the top).

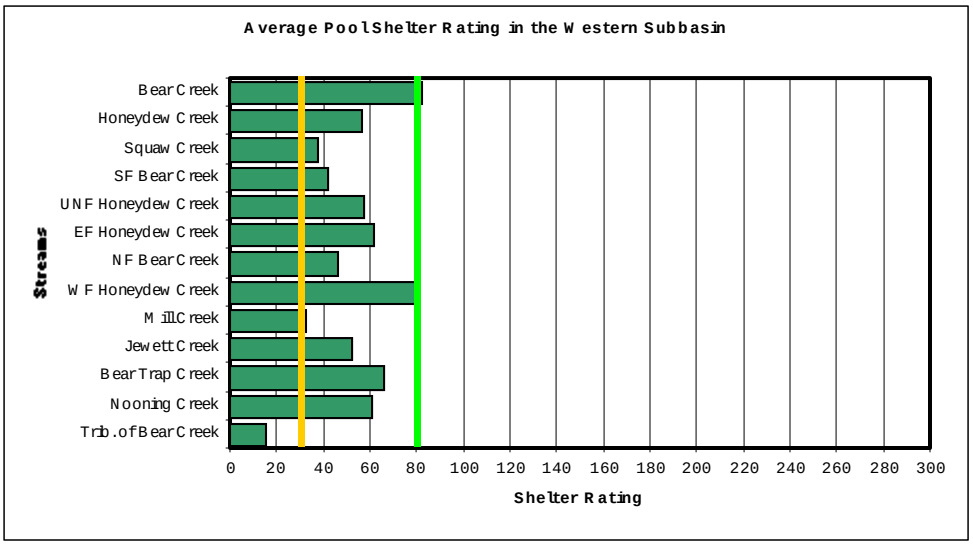


Figure 58: Average Pool Shelter Ratings from DFG Stream Surveys, Western Subbasin.

As described in the EMDS response curves, average pool shelter ratings exceeding 80 (green line) are considered fully suitable and average pool shelter ratings less than 30% (yellow line) are fully unsuitable for contributing to shelter that supports salmonids. Streams are listed in descending order by drainage area (largest at the top).

Subbasin Trends

The trends for several factors within the Mattole River tributaries in the Western subbasin can be summarized as follows. The size and density of the riparian zone woody vegetation in privately owned timberlands will increase over time due to timber harvesting plan regulations. Those timberlands owned by the public, a significant percentage of the subbasin, are withdrawn from management activities and the size and density of the riparian zone woody vegetation is also expected to increase over time. Trends for riparian zones bordered by or containing roads are also unclear. It is possible that some roads may be abandoned and riparian vegetation re-established, but many of the roads are County roads, lead to streamside County Roads or access rural residential parcels. Riparian vegetation may be sacrificed in road maintenance activities, both regular and storm induced.

The number of roads within this subbasin may remain about the same overall since the Bureau of Land Management (BLM) is removing roads that are no longer necessary for their management objectives while some roads may be built on private timberlands that will be harvested for the first time since the application of current Forest Practice rules. These rules and current practices generally require road systems located high on the slope unlike earlier timber harvest and transportation systems that established roads low on the slopes, often near streams.

The short time period of stream temperature data results does not allow for any trend analysis. There is no data on suspended sediment.

The relative disturbed stream channel percentage was highly variable, but parts of the channel disturbance in the North Fork Bear Creek appeared to have decreased substantially during the time period of 1984 to 2000. Shenanigan Ridge and Woods Creek, both planning watersheds with a lower percentage of disturbed channel remained relatively constant during the time period of 1984 to 2000. Analysis of previous years has not been undertaken to see if this is a continuing trend. Both the 1955 and 1964 floods were one hundred year return events while all other major storm events in the years

1951-2000, the period of record for the Petrolia stream gauge, hover around the ten year flood event level.

Current estimated populations of chinook salmon and coho salmon throughout the Mattole Basin are low compared to United States Fish and Wildlife Service (USFWS) estimated populations in 1960. Outmigrant trapping of steelhead trout appears to indicate that their population is closer to the 1960 USFWS population estimate. However, not enough quantitative data on any salmonid species exists to establish clear trends on a subbasin basis.

Western Subbasin Issues

- Roads – The rural road system is not as extensive as in the other subbasins; however, there is concern over abandoned roads, and road maintenance issues related to landsliding and sediment input on both public and private lands. Without appropriate maintenance or storm proofing, existing roads, both active and abandoned, may continue to supply sediment. BLM is actively removing or "erosion proofing" many of their roads.

- Sub-division and associated impacts are restricted to the northern and eastern margins of this subbasin, outside of the publicly owned lands. BLM's road access policies pertaining to public lands are an ongoing issue with residents adjacent to the public lands.

- Limited water chemistry data available indicates acceptable pH, DO, and nutrient levels.

- The geology of the Western subbasin is highly variable but is generally more susceptible to landslides and erosion in the easterly and northerly portions (CGS, 2002).

- Large dormant landslide complexes and a limited number of active landslides are identified on the soft to moderate terrain forming along the highly sheared bedrock present along the Lower North Fork and South Fork of Bear Creek and Lower East Fork of Honeydew Creek (CGS, 2002).

- Relatively few deep-seated dormant landslides but abundant debris slide slope and inner gorge have been mapped in steep and hard terrain of the King Range, along with a moderate number of active debris slide scars concentrated adjacent to drainages (CGS, 2002).

- West of Honeydew and in the upper reaches of Squaw Creek, large deep-seated landslides, historically active earthflows, and gully erosion on grass-covered highlands have been mapped in on the soft to moderate terrain formed along the broad, pervasively disrupted, west-trending Cooskie shear zone (CGS, 2002).

- The moderate terrain is primarily mapped as moderate to high landslide potential (CGS, 2002).

- The hard and soft terrain as well as moderate terrain on the debris slide slopes is typically mapped as high to very high landslide potential.

- The soft terrain is interpreted as having mostly a high to very high landslide potential whereas the moderate terrain ranges from moderate to very high, dependant on occurrence of landslide and debris slide slopes. Stability of the hard terrain is typically interpreted to range from moderate to high potential (CGS, 2002).

- The 2000 air photos reveal that six of the seven PWs within the Western subbasin have shown a significant decrease in negative channel characteristics, with no significant change in the number of gullies (CGS, 2002).

- Two PWs, Big Finely and Squaw Creeks, have shown notable decreases in lateral bar development, which suggest decreases in excess sediment (CGS, 2002).

- Eroding banks are found in localized areas intermittently dispersed throughout the Western subbasin with the notable exceptions of the Shenanigan Ridge and South Fork Bear Creek Planning Watersheds. The Squaw Creek, Honeydew Creek, and Woods Creek PWs have some of the longest total lengths within the subbasin (CGS, 2002).

- Summer [DFG16]high temperatures exceed the suitable range for salmonid rearing in the lower reaches of the larger streams. Temperatures are within fully suitable conditions in upstream reaches of larger and smaller tributaries sampled.

- Based on limited sampling, instream conditions indicate moderate sediment levels. The limited data available suggests that there is a degradation of habitat due to instream sediment accumulation in the lower gradient reaches of the larger tributaries.

- Large woody debris recruitment potential is currently poor for the majority of this subbasin but is expected to improve over time (as a result of the BLM management policies within the King Range National Conservation Area).

- The DFG has conducted a preliminary analysis on data collected by BLM since 1996 on seven tributary streams. The results show the samples were rated as good in terms of overall conditions. Additional data for aquatic macroinvertebrate productivity would be useful for effective monitoring purposes.

- Removal of in-stream large woody debris under direction of the DFG occurred in about forty-nine stream miles in this subbasin during the 1980's. A total of 19,136 cubic feet of wood was removed. This is equivalent to 153 logs 2 feet x 40 feet. This activity likely had adverse local impacts on salmonid habitat conditions. Instream habitat diversity and complexity was impacted by this action.

- Based on current surveys available, instream habitat appears to be recovering.

- In[DFG17]-stream habitat diversity and complexity, based on available survey data, i.e. pool depths, cover, and large woody debris may be adequate for salmonid production.

- All three anadromous salmonid species are present. In 2001, the DFG Coho Assessment Project staff observed coho in four streams in this subbasin. The upper reaches of the three major tributaries in this basin are considered good refugia, and this will continue due to BLM ownership and management of key headwater reaches. Fish populations are low at this time, but are expected to increase due to public stewardship within the basin.

- Three salmon rearing facilities are located within this planning basin and have been operated by the Mattole Salmon Group since the mid 1980's. These operations have generally been successful and should be continued in order to supplement wild populations of chinook & coho salmon to allow long-term restoration efforts to work.

- In order to protect privacy while developing data, the possibility of training local landowners to survey their own streams to conduct salmonid population status surveys would be advisable to help determine fish populations throughout this planning basin.

Western Subbasin Issue Synthesis

Working Hypothesis 1:

SUMMER STREAM TEMPERATURES IN SOME SUBBASIN TRIBUTARIES ARE NOT WITHIN THE RANGE OF TEMPERATURES THAT PROVIDE SUITABLE CONDITIONS FOR HEALTHY ANADROMOUS SALMONID POPULATIONS.

Supportive Findings:

- MWATs for Honeydew Creek reached 78.5ºF in 1999. In Bear Creek, MWATs reached 71.5ºF in 1998.
- Squaw Creek had MWATs ranging from 70.4ºF in 1998 to 69.5ºF from 1996-1999.
- Historic [DFG18]timber harvest has reduced canopy closure in near stream areas and likely contributed to elevated stream temperatures.

Contrary Findings:

- MWAT of 57.9ºF for 2001 in Nooning Creek.
- MWATs in Mill Creek (lower) consistently within one degree of 58ºF for 1997, 1998, 1999, 2001, 1998-1999.

Working Hypothesis 2:

AGGRADATION FROM FINE SEDIMENT IN SOME STREAM CHANNELS OF THIS SUBBASIN HAS REDUCED CHANNEL DIVERSITY NEEDED TO PROVIDE SUITABLE CONDITIONS FOR ANADROMOUS SALMONID POPULATIONS AND HAS COMPROMISED SALMONID HEALTH.

Supportive Findings:

- Air photos and field observations show that the Mattole River bordering the Western subbasin downstream of Honeydew Creek is highly aggraded with sediment.
- Field surveys of Lower Honeydew Creek and Squaw Creek found less than 40% of their lower reaches by length were composed of pools, indicating a lack of pool habitat.
- Air photos after the 1955 and 1964 floods indicate significant changes in the stream channel in the Western subbasin.
- Air photos and field observations show that the Mattole River bordering the Western subbasin downstream of Honeydew Creek is highly aggraded with sediment. (CGS, 2002)

Contrary Findings:

- V* of 0.26 for Mill Creek, 0.24 for Squaw Creek and 0.22 for Honeydew Creek in 2000 indicating low to moderate residual pool filling.

Working Hypothesis 3:

A LACK OF LARGE WOODY DEBRIS IN SOME STREAM REACHES OF THIS SUBBASIN HAS REDUCED CHANNEL DIVERSITY NEEDED TO PROVIDE SUITABLE CONDITIONS FOR ANADROMOUS SALMONID POPULATIONS AND HAS COMPROMISED SALMONID HEALTH.

Supportive Findings:

- Field observations indicate that amounts of instream large woody debris in the mainstem Mattole River and its tributaries in the Western subbasin are low.

- Historic [DFG19]timber harvest throughout the Western Subbasin tributaries frequently removed large conifer vegetation down to the stream bank, severely reducing the available recruitment supply of large woody debris.

- Riparian vegetation is in size classes that are not expected to contribute large woody debris in significant quantities in the near future.

Recommendations:

1. Ensure that near stream areas are managed to reduce solar radiation and moderate air temperatures in order to reduce heat inputs to the Mattole River and its tributaries.

2. Monitor summer water and air temperatures to detect trends using continuous 24 hour monitoring thermographs.

3. Where current canopy is inadequate and site conditions are appropriate, use tree planting and other vegetation management techniques to hasten the development of denser and more extensive riparian canopy.

4. Encourage the monitoring of in-channel sediment and tracking of aggraded reaches in the lower basin by establishing monitoring stations and training personnel.

5. Continue efforts such as road improvements and decommissioning throughout the basin to reduce sediment delivery to the Mattole River and its tributaries. Road inventories have been completed for a much of this planning basin, and it is recommended that this effort should be continued until a complete inventory is compiled.

6. Maintain and enhance existing riparian cover. Use cost share programs and conservation easements as appropriate.

7. Based upon the latest science on placement of large woody debris in stream channels managers in the Western subbasin should work to improve channel structure and function for salmonids.